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The maturity of modeling
A comment on "Modeling the Cultural Evolution of Language" by Luc Steels

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Language is a shared property of a networked group of individuals that use it to communicate. Is language structure mostly determined by the properties of the individuals representing the nodes of that network? Or rather, is it an emerging feature of the cultural dynamics taking place on the links of the same net? The paper by Luc Steels [1] overtly embraces the latter hypothesis: Language is primarily shaped by cultural processes. The review acknowledges the important results obtained by the Biolinguist approach, such as the ones about compositionality [2], but it argues that cultural evolution is stronger than usually thought, and therefore less innate structures of the individuals are necessary. A detailed analysis of some representative, and important, achievements of Evolutionary Linguistics persuasively supports this thesis.

It is worth highlighting the word "Modeling" in the title, and the importance acquired by computational and robotic experiments both for Biolinguistics and Evolutionary Linguistics. Actually, these methods have started to become pervasive in the last few years. In the last "Evolution of Language" conference (Utrecht, 2010), for example, results from simulations and mathematical modeling popped up repeatedly also in talks given outside the traditional "Modelling" track. Steels' review shows us why: Artificial experiments and analytical models have today the maturity to allow researchers to test their theories carefully, checking into the consequences of the different hypothesis. The trend is likely to be stable, and modeling will become as important in this field as it already is in other areas. At that point, a separate "Modelling" track could probably disappear, and the focus could move

from the methods to the subjects of research. This is what already happens in Steels review, that concentrates on modeling but correctly frames it as a further source of information, next to typology and historical linguistics, to corroborate the theses of Evolutionary Linguistics.

A first-class review forces also to reflect. The author says: "Agent-based models are necessarily complicated". To a physicist, this sounds alarming. In the struggle between an apparently more realistic model and a simpler one, my instinct would choose the latter. Simple microscopic rules and agents architectures permit a deeper understanding of the global-scale emerging dynamics. Indeed, simple models have already provided important insights into such problems as the emergence of compositionality [2], the categorization of color [3] and its universality [4], and the possible genetic basis for human language [5]. However, Steels' argument is compelling. The sketched complexity of the intentional-conceptual system, of the semantics and of the emerging languages is spectacular. Not to mention the issues connected to the embodiment and sensory motor systems. Facing all this, I have to admit (quite intimidated) that the author might be right, and that in this context models probably do have to be complicated. The challenge is therefore to avoid *unnecessary* complication, keeping in mind that simplicity is always to be pursued. "Make things as simple as possible, but not simpler", Albert Einstein said. He was right, and in modeling language evolution we should not forget his lesson.

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